Bake, Build & Barter:
The Maths of Practical Life

Waldorf Curriculum - Third Grade

Unit Design

Each unit is designed as a 3 – 4 week long main lesson block made up of four recurring lesson plan components: Introduction, Activation, Exploration and Extension.

Introduction

Before beginning a new topic, it is useful to know your child's preconcieved notions about a subject; that is, a sort of a Pre-Test. The introduction generally takes the form of discussion questions or an initial activity.

Activation

The activation follows the introduction and answers the question: "Who cares?" This is similar to activating a toy for a small child; they see it but can't think of anything to do with it so they continue to complain that they are bored. Your child may see the topic at hand, but fails to see that it holds any interest for them. For a third-grade child (8-9 years), this is usually because the subject isn't seen as being relevant to "real life." A successful activation will engage your child's interest and set the stage for your explorations.

Exploration

This is the stage in your lesson plans where the subject is explored as thoroughly as possible. The process of exploration takes place in Sets, which are groups of activities completed over several days, and include a wide variety of actvities and integrated subjects such as art, music & movement, nature, cooking, and handwork. You can move through these at a pace which is comfortable for your child; each Set is not necessarily one day's work. Quality is more important than quantity when it comes to completing the activities within a Set. Through the process of exploration, the child will engage in journalling and complete pages in their main lesson book, recall orally what they have learned, and synthesize new learning with previously learned content. Exploration is the process of making connections – this is the time of the "aha!" moments.

Extension

Depending on your schedule and your child's depth of interest in a subject, you may wish to spend additional time on a unit. Extension ideas are given which you can use to explore the topic further at this time (whether to give additional coverage to a subject which your child finds difficult or to give your eager child more time with a subject he really enjoys) or later in the year. They are also useful for filling in small blocks of time which come up during the school year such as transitions into and out of holiday breaks.

Parent Preparation

Starting Your Day

A successful school day **begins with you.** For this reason, each lesson block begins with a meditation for the parent to use when beginning his or her preparation time. This meditation time is absolutely essential. You must take the time each day to prepare yourself for teaching by reviewing the knowledge to be transmitted, your goal for your child's learning, your child's developmental stage, the nature and temperament of his being and your own, as well as planning how to maintain the rhythm of your teaching and your day in the face of any obstacles which may arise. For example, knowing that you have a first grade child and a two-year old, you wouldn't try to begin your main lesson block while the toddler entertains herself independently in another room – you would shortly be interrupted by tears of frustration or boredom from the younger child. Then getting up and leaving, saying briefly to your older child, "I'll be back," coaxing the toddler into a new entertainment, rushing back to your first grade lesson, saying "now then, where were we?"… this undermines the entire purpose of your teaching. Remember, children learn from what you do but they learn much more from how you do it. Showing your child that learning together is a precious time, to be treasured and enjoyed, will go a long way toward building what teachers like to refer to as a "life-long learner."

Teaching the Main Lesson

The Main Lesson is one of the basic elements of the Steiner curriculum. It involves the thorough working of the main subjects (such as geography, science, history, mathematics or literature), taught in main lesson blocks of about two hours per day, over several weeks. It is always conducted in the morning, when the children are fresh and is followed by a change of activity.

The topics are approached through a variety of means, including stories, painting, recitation, a physical group project or a game, until the children have made some connection to it with every part of themselves. It is then set aside to 'digest' and a further topic is taken up. This pattern is natural to children, as anyone who has observed the success of 'crazes' in a playground will know. The result is a thorough and satisfying assimilation of knowledge, thus maintaining the child's enthusiasm for learning.

A standard planbook format, with a grid consisting of topics to be studied and activities for the day, is not adequate when preparing for a Main Lesson block. Try, rather, a cluster of blank pages in a three-ring binder or a large spiral-bound tablet of blank paper. Each day's preparation should consist of the front and back of two consecutive pages:

Page One: Meditation

On the first side of the first page, write out the day's meditation longhand. This will help you to internalize its essence, as well as reminding you to take the time for your personal daily meditation and spiritual preparation.

Page Two: Main Lesson Block Content & Notes

On the back of this page write the topic of the day's main lesson and make your notes as to the varying sources you will use and integrate into its teaching. This page will include pieces of music and artwork, nature walks and activities, stories to tell, and your own personal resources to prepare for teaching the topic such as newspaper, magazine, or encylopedia articles, books, plays, and any other art or language experience which will help you to convey the day's lesson.

Page Three: Daily Schedule

On the facing page – that is, the first side of the second page – write the schedule for the day, including what you are teaching and roughly when you intend to do each activity. The main lesson block for first grade is 1 ½ hours initially and then 2 hours as the child becomes more used to academic work. After the main lesson, a more active time period is necessary, such as outside play. You will be able to determine yourself what type of schedule works best for your child and your family as a whole. Be sure that you have not forgotten any of the components of your module; although not every topic is done every day, there should be time allotted to each of your child's subjects at some point in every week.

Page Four: Journal & Planning

On the back of your schedule page, write your notes and reflections after the day has passed. These journalling pages and observations will be an invaluable resource as the school year passes. Do not forget to take some time each day to reflect on the learning that has taken place between you and your child, and to write down both the practical (teaching strategies that did or didn't work, your child's breakthroughs and struggles) and the philosophical (how teaching the lesson touched you emotionally, things you are learning about your child's being or your own, inspirations, doubts, and fears); doing this will make you a much better teacher and enrich you as a parent. Along with your journalling, do some lesson planning for the future while ideas inspired by today's lesson are still fresh in your mind. Be sure to write down what you will need to do to prepare yourself for teaching future topics as well, such as learning to knit, or to find the best resources for teaching the foreign language you have chosen.

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Baking:
Time, Temperature, Weight & Volume

Booklist: Main Lesson

One Grain of Rice. by Demi.

A Child's History of the World. by V. M. Hillyer.

The Story of Clocks and Calendars. by Betsy Maestro.

I Took the Moon For a Walk. Carolyn Curtis.

Thirteen Moons on Turtle's Back. by Joseph Bruchac.

Festivals Family and Food. by Diana Carey & Judy Lange.

Somewhere in the World Right Now. by Stacy Shuett.

"Everyday Food" magazine, November 2005

The Agony and the Ecstasy. by Irving Stone.

Little House on the Prairie. by Laura Ingalls Wilder.

The Duchess Bakes a Cake. by Virginia Kahl.

The American Girls Handy Book. by Lina and Adelia Beard.

The Magic Bean Tree. by Nancy Van Laan.

Parent Background

The Clan of the Cave Bear. by Jean M. Auel.

Time's Pendulum: From Sundials to Atomic Clocks, the Fascinating History of Timekeeping and How Our Discoveries Changed the World. by Jo Ellen Barnett.

Suggested Read-Alouds

The Phantom Tollbooth. by Norton Juster.

Tuck Everlasting. by Natalie Babbitt.

Independent Skills Review

Mathematicians Are People, Too. by Luetta Reimer.

The Little House. by Virginia Lee Burton.

Daily Meditation

Look to this day!
For it is life, the very life of life.
In its brief course
Lie all the verities and realities of your existence:
The bliss of growth
The glory of action
The splendour of achievement,

For yesterday is but a dream
And tomorrow is only a vision,
But today well lived makes every yesterday
a dream of happiness
And tomorrow a vision of hope.

Look well, therefore, to this day!
Such is the salutation to the dawn.

from the Sanscrit

Lesson Plans

Introduction – Time

"So what is time? If no one asks me, I know; if they ask and I try to explain, I do not know."
– St. Augustine

Discuss this quote with your child. Can she explain what time is?

Activation

One Grain of Rice

Read One Grain of Rice. For the next 30 days (or for as long as you can) replicate this. Start with one grain of rice – set up a Math table – write "Day One: 1 grain of rice" on an index card and add it to the table.

Remove all clocks and calendars (you may be surprised at how many there are!) from your home. If you have to have some sense of time, keep one clock and one calendar hidden away in your bedroom (you may also be surprised at how many times you walk in to check the time).

Tell your child that tomorrow you will add another grain of rice to your math table. Now, ask your child, without clocks and calendars how will we know when tomorrow is?

answer: when the sun rises and sets

Begin lesson about the history of time.

Explorations

Set A:

Parent Background: The Clan of the Cave Bear

A Child's History of the World – Read/retell to your child chapter one "How Things Started" (optional, based on religious beliefs) and chapter two "Umfa-Umfa and Itchy-Scratchy" of A Child's History of the World. How often did the earliest people need to know what time it was? What ways did they have of telling time? Discuss these questions with your child without providing the answers, let her form her own opinions.

The Story of Clocks and Calendars – Have your child read pages 10-13 of The Story of Clocks and Calendars.

I Took the Moon for a Walk – Read I Took the Moon for a Walk this evening. Take an evening nature walk and observe the phase of the moon. Have your child sketch a picture of the moon on an index card and label it with today's date. Hang the card up over your Math table.

Just as with the grains of rice, continue the evening nature walks and sketches of the moon and its changing cycle throughout this unit. It is wonderful for your child to see the rice piling up alongside the waxing and waning of the moon; these two activities provide a very concrete sense of the progression of time, something which young children often find abstract.

moonrise/moonset times: www.waldorfcurriculum.com

Set B:
Revisit yesterday's discussion questions. Ask your child to explain her answers using information she learned yesterday. Ask her to tell you what it might have been like to live as the earliest people did. What things were important to them? What things were not?

Main Lesson Book: have your child compose a short text and corresponding illustration to demonstrate her understanding of yesterday's discussion questions.

The Story of Clocks and Calendars – The next evolution in the history of time was the invention of the written calendar. Have your child read pages 14-18 of The Story of Clocks and Calendars. Why do you think calendars were invented before clocks? What were the first written calendars used for?

Thirteen Moons on Turtle's Back – Like the Chinese, Native Americans named their months based on the changing seasons. Read Thirteen Moons on Turtle's Back. If you had to name our twelve months, what would you call them? What is the most important thing to you in each month?

Festivals Family and Food – Have your child read "The Calendar" by Barbara Euphan Todd on page vii of Festivals Family and Food. Create a family calendar for 2006 using your child's newly-invented month names and corresponding illustrations. Bring your own calendars back as well.
http://jas.familyfun.go.com/arts-and-crafts?page=CraftDisplay&craftid=11152

Set C:
What could have happened that made people invent clocks? How is a clock different from a calendar?

Parent Background: Time's Pendulum, chapter 2

The Story of Clocks and Calendars – Have your child read pages 34-35 of The Story of Clocks and Calendars. Construct a sundial (this takes two days).
http://www.live-education.com/3rdGrLessonTime.html

Main Lesson Book: have your child compose a short text and corresponding illustration to demonstrate her understanding of how a sundial works.

Set D:
Parent Background: Time's Pendulum, chapter 3

The Story of Clocks and Calendars – Have your child review page 35 of The Story of Clocks and Calendars. What was the biggest problem with using a sundial? What other kinds of clocks were invented?

A Child's History of the World – Read/retell to your child chapter 45-46 "Arabian Days," "A Light in the Dark Ages," and "Getting a Start" of A Child's History of the World. Where are Europe and the Middle East? Locate them on the globe. They don't seem that far apart! Why didn't new inventions such as a pendulum clock spread more rapidly around the world?

Choose one type of clock to make:

- water clock
- burning candle
- hourglass

Have your child invent this entire project, although you should supply materials. Ask her first which one would be the easiest to make. Then have her draw out a plan for how it will work. See if she can design a clock which can accurately measure a given passage of time:

For a water clock, four accurate hours in a row
For a burning candle, four accurate hours in a row
For an hourglass, one hour

Making striped candles: http://www2.lowprice4u.com:3000/TheSource/article.asp?PageID=299

Main Lesson Book: have your child compose a short text and corresponding illustration to describe how difficult it is to create an accurate device to measure the passage of time

Set E:
Introduce and practice reading an analog clock.

Make your own clock:
http://www.creativehomeartsclub.com/IMG_Includes/pdf/03JANFEBWALLCLOCK.pdf

Instead of using a template to place the numbers at their correct positions on the clock face, you can have your child observe the location of the hour hand each time the minute hand makes one complete revolution and place a small piece of tape there. When all twelve hours have been marked, add the clock numbers by hand.

While making the clock, your child may notice that the numbers only go from 1 to 12, while there are 24 hours in a day. Use this opportunity to introduce the terms AM and PM. You can also discuss military time where, to avoid confusion, all 24 hours are used. For example, 1300 hours is 1 pm. Have your child practice making conversions between standard time and military time.

Introduce and practice reading a digital clock.

LENGTHS OF TIME

Time is peculiar

And hardly exact.
Though minutes are minutes,
You'll find for a fact
(As the older your get
And the bigger you grow)
The time can
Hurrylikethis
Or plod, plod, slow.

Waiting for your dinner when you're hungry?
Down with the sniffles in your bed?
Notice how an hour crawls along and crawls along
Like a snail with his house upon his head.

But when you are starting
A game in the park,
It's morning,
It's noon,
And suddenly it's dark.
And hours like seconds
Rush blurringly by,
Whoosh!
Like a plane in the sky.

- Phyllis McGinley

"Lengths of Time" Game:
Choose a time increment to measure. Turn your back until you think it's been (whatever measurement) then quickly turn back and read the clock. Were you correct? Each person takes turns, getting one point if they were able to judge the time increment correctly. Determine in advance the allowable margin of error (within within *x* seconds or minutes or whatever).

You can bring all the clocks back out now, too. Aren't you happy?

Set F:
Having spent all this time making clocks, your child may be getting frustrated with the study of time. Why do we care? Why does a clock have to be accurate? Go into the city to do a day of shopping or sightseeing, completely failing to take a bus schedule with you. Make it as obvious as you can, by missing several buses. When you get home, talk about how the invention of the railroad was the impetus for standardizing time.

Parent Background: Time's Pendulum
mechanical clocks (chapters 4 – 9)

time zones (chapters 10 – 12)

Somewhere in the World Right Now – Remember, in every part of the world, noon is considered to be when the sun is at its highest point. Go stand outside at noon (when checking to see if the sun appears to be at its zenith, be sure to tell your child never to look directly at the sun). Now

go to the other side of the backyard from your child. Does the sun appear to be at its highest point for you? For her? Of course, because you're not that far away from each other. But what if you were farther away? Go inside and look at a globe. Shine a flashlight on it and spin the globe. See how the sunlight moves across the face of the earth?

Canadian civil engineer Sir Sandford Fleming started the efforts which led to the adoption of the present time meridians in both Canada and the United States. Time zones were first used by the railroads in 1883 to standardize their schedules. Fleming also played a key role in the development of a worldwide system of keeping time. He advocated the adoption of a standard or mean time and hourly variations from that according to established time zones.

World time zone map: http://aa.usno.navy.mil/faq/docs/world_tzones.html
Print and color in each bar of time.

Talk also about daylight savings time. This is due to the fact that the sun rises and sets at a slightly different time each day. Begin to record what time sun rises and sets each day (or just sunset). How does it change over several weeks?

sunrise/sunset times: www.waldorfcurriculum.com

Set G:

Often, when we are using time on a daily basis, we don't have to be quite so exact. Have your child help you prepare dinner. Choose one dish to make which requires you to set the timer. Talk out loud to yourself while you cook, demonstrating how to round time. "Let's see, we have *about* fifteen minutes left before the turkey is done."

Practice rounding time to the nearest hour, half hour, and quarter hour.

Main Lesson Book: have your child compose a short text and corresponding illustration to explain one situation where knowing the exact time is important and one situation where it is not

Extensions – Astronomy; Astrology

Have your child read pages 19-23 of The Story of Clocks and Calendars.

Astronomy extensions:
locate the North Star, learn the stories of and be able to identify several constellations in the sky
http://shop.store.yahoo.com/pomegranate/k183.html

Astrology extensions:
learn your astrological sign, have a birth star chart done

Lesson Plans

Introduction – Temperature

"Everyday Food" November 2005

Read page 56 of "Everyday Food" with your child. Listen to the day's weather report (or read it in the newspaper). Ask your child to define the word "temperature".

Activation

Just as with time, systems to record and convey information about temperature were invented by mankind, although temperature itself is a naturally ocurring phenomenon. Who do you think the first person to measure the temperature of something was? Why did they care?

Post a thermometer outside your front door and have your child check and record the temperature three times each day (morning, mid-day, and evening). Make a large chart out of graph paper and post it above your math table. Add the new data as it is gathered each day. It is useful for your child to make the graph on her own, deciding what should information be on the x-axis and what should be on the y-axis, as well as the units of measurement. Expect that revisions will be made and a new chart drafted partway through the information gathering as your child finds the easiest and best way to convey this data.

Explorations

Set A:

We use temperature mainly to do two things – dress for the weather and cook our meals. And we don't really need to know the exact temperature to get dressed each day, stepping outside in the morning or remembering what it was like yesterday is usually sufficient. But in cooking, temperature becomes extremely important!

The Agony and the Ecstasy – Read chapter 3 of The Studio to your child, from "He turned the sharp corner of Via dei Bentaccordi" up to "'I have eaten well!'" This passage describes Michelangelo's stepmother's intense joy of cooking and the complicated meals she used to prepare. Turn to your child and say, now let's try a delicious meal like that. Sit down and make up a list of the ingredients in the *torta* as described in the text. Now, try to make it! You may be able to guess at proportions, but without knowing the temperature or length of time to cook it at, your meal will most likely be a failure. This is essential information which must be conveyed when sharing a recipe.

Here's another example (this one gives you time but not temperature). Can you make this dish?

> *Salmon a la Melville*
> Put slices of salmon into a baking pan with a little white wine and water. Sprinkle with salt and bits of butter. Place in the oven and bake for fifteen minutes.

Little House on the Prairie – Have your child look through the pictures in Little House on the Prairie to find scenes of cooking and prairie life. Read chapters 3 & 4. This was not that long ago, yet Ma was cooking over a campfire. How did people used to know the temperature of what they were cooking?

Parent Background: http://www.dvo.com/newsletter/monthly/2004/november/tabletalk2.html

If you have a fireplace, try making cornbread in a cast iron pot hanging over the fire (as illustrated in the chapter "Indians in the House") or roasting sweet potatoes in their jackets in the coals of the fire, then wiping them clean (as described at the end of the chapter "Santa Claus"). How difficult is it to cook without accurate directions?

Set B:
Although Anders Celsius invented the scale we use most often today, he was not the first to develop a system for measuring temperature. Using the information in the Parent Background reading, tell your child the story of Celsius and the work that he did.

Parent Background: http://rivapprod2.riverdeep.net/current/2001/11/112601_celsius.jhtml

It's not practical to make your own mercury or digital thermometer, so focus this time on helping your child understand the need for a univeral system of measurement.

Observe whether your Celsius thermometer is accurate by measuring the temperature at which snow melts and water boils.

Main Lesson Book: have your child compose a short text and corresponding illustration to explain how Celsius invented his scale and why it is important to be able to measure temperature

Set C:
"Everyday Food" November 2005 – Preparing a meal requires the integration of time and temperature concepts. Give your child as much experience cooking as possible, using recipes from Festivals Family and Food, The American Girls Handy Book, "Everyday Food" magazine, and other sources. This will also introduce the use of other measuring tools, such as those used to measure weight and volume, and will provide a transition into the next section of the unit.

Have your child begin work on her cumulative project at this time.

Extension – Medicine

Doctors use temperature for yet another reason: to tell when the body is fighting illness. Visit your child's pediatrician and have him demonstrate and explain how body temperature is taken in several ways (generally by measuring the temperature of the mouth and the ear). Ask the doctor to explain why your temperature rises when you are sick, as well as how to bring the body's temperature back down.

Lesson Plans

Introduction – Weight vs. Volume

The American Girls Handy Book Home-Made Candy, chapter XLI

There is one more type of measurement commonly used in the kitchen and that is quantity. Try making the Chocolate-Creams recipe in The American Girls Handy Book. In order to make sure you have an equal quantity of water as egg white, you must measure the amount of egg white. What tool do you have in the kitchen that works best for this job?

Activation

There are two types of quantity measurements: weight and volume. What is the difference? For this activity you'll need to have a dog – either your own or borrow a friend's. Fill your bathtub nearly to the brim with water. Take your dog into the bathroom with you and start to put him in. Will your child protest at this? Probably. Why? Because she knows that if you put the dog in with all that water the bathtub will overflow. Tell her, "No it won't. I'll prove it to you." Weigh the dog on your bathroom scale. Now tell her triumphantly that you know the dog will fit in the bathtub with all that water because he weighs *x*. See if she can explain to you that it's not how heavy he is that makes the water spill over the sides, it's how much space his body takes up. If she doesn't protest just put him in the tub anyway and see what happens. Then see if she can explain to you what went wrong and why.

Main Lesson Book: have your child compose a short text and corresponding illustration to describe the difference between weight and volume as well as the disasterous dog bath incident

Explorations

Set A:

One Grain of Rice – Reread One Grain of Rice. No doubt, by this time, you've been forced to stop piling rice upon your Math table because it was getting to be such a tremendous amount. Talk about what vessels are used in the book to contain the rice, as well as what you used. Were you measuring the weight or the volume of the rice?

Try replicating the first several (as many as you can) days of the One Grain of Rice problem, measuring the weight and volume of the rice each time. Does the weight of the rice double exactly as its volume doubles? Make a chart showing the results of your experiment.

Set B:

"Surprise Egg" Game
(use two-part plastic Easter eggs, available from craft stores, or subsitute another set of identical containers instead)

Every identical plastic Easter egg can hold the same volume. But, depending on what they are filled with, they can have very different weights. You and your child will each be given several eggs to fill with household items. Work secretly so no one will know what is in the eggs. If you can, try to fill the egg completely so that there is no sound to give away the contents. Close the eggs and place them all together in one basket. Take turns choosing an egg. Explore the feel of each egg and try to guess what is inside based on its weight. Your own eggs will be in there as well but you may find it hard to pick them out from the pack! Players are awarded one point for every correct guess. The person with the most points wins.

Set C:
Gather a selection of boxes from the grocery store (such as cereal boxes) labeled "This package is sold by weight, not by volume, and may not appear full due to settling of contents." Can your child explain what this means and why it appears on the package?

Set D:
Just as with time and temperature, it is important for your child to be familiar with the standardized units of measurement for weight and volume. However, unless your child has done a lot of cooking in the past, these units may be the least familiar of those studied in this unit.

Parent Background: Cooking With the Metric System article (see following pages)

Consider the following recipe:

> *Stewed Haddock*
> Lay pieces of fish in a pan with the skin side up. Sprinkle with salt and cayenne, and cover tightly, allowing the fish to stew in its juice for twenty minutes. Then add a quarter of a pound of butter rolled in flour, and a quarter of a glass of wine. Stir the liquor and simmer for a few moments, when it is ready to serve. No water should be used.

What units of measurement are given? A quarter of a pound of butter and a quarter of a glass of wine. Are these standardized units of measurement? Would a wineglass make a good unit of measurement? (It is, in fact, a standardized unit although it doesn't look it; online I found that a wineglass is considered to be 4 oz or 119 mL. Seems somewhat risky, though.)

The Duchess Bakes a Cake – With savory dishes, such as the Stewed Haddock, you can judge measurements off the cuff with little chance of failure. But what happens when you are baking something and don't measure your ingredients? Read The Duchess Bakes a Cake, then try it! Throw any old thing into the pan and see what happens. With any luck the recipe will be awful, which helps to prove your point (do your best to ensure failure; I once made a muffin recipe with only half the amount of flour called for and it turned out great, so sometimes failure takes some effort). In short, unlike savory cooking, baking is highly dependent on accurate measurements of weight, volume, and temperature. That's because baking is a more scientific process, with necessary chemical reactions which must proceed properly or your food will be a flop.

Main Lesson Book: have your child compose a short text and corresponding illustration to explain why exact measurements are more important in baking than in savory dishes (soups, stews, casseroles, and so on)

Set E:
Pound Cake: http://www.joyofbaking.com/PoundCake.html
The French call this a quarter cake, as it is traditionally made up of equal amounts of just four ingredients: 1 pound of flour, 1 pound of butter, 1 pound of sugar, and 1 pound of eggs. To get the best results you should, in fact, weigh your eggs. Try making this cake with your child. How many eggs do you find it takes to make a pound?

Note: to scale the recipe down, put the number of eggs you'd like to use on one side of the balance and measure your flour, butter, and sugar to match the weight of your eggs

Pound Cake Recipe:

1. Cream the butter and sugar together until fluffy.
2. Beat in the eggs.
3. Gradually sift in the dry ingredients, alternating with small additions of the milk.
4. Transfer to a greased and floured baking pan.

Bake at 175 °C (350 °F), until a skewer inserted shows no moist crumbs.

Continue to practice recipes with your child to gain practical experience in the use of standard units of measurement for weight and volume.

Extension –Carats and Karats

The Magic Bean Tree

Jewelers use two unique units of measurement: carats and karats. These two words both come from the same source: the Arabic word for "bean pod." Read The Magic Bean Tree. Have you ever seen a carob bean? http://www.herbalhut.com/carob.htm

Parent Background:
Much as we all love beans, not many of us would go so far as to equate the finest jewels and gold with lowly little legumes, so how did we come up with "carat" and "karat"? Well, when jewels first began to be used as a means of exchange and payment, people needed a way to measure their relative weight and consequent value. Traders discovered that the smallest jewels weighed about the same as one bean, so larger gems could be described as "two beans" -- two carats -- and so on. The beans in question were, by the way, carob beans.

Carob trees have grown in the Mediterranean region since antiquity. The trees produce small, edible seed pods containing carob beans. Carob beans are unusually consistent in size. This means that carob beans usually all weigh the same, no matter when or where harvested. This characteristic of consistent weight led to carob beans becoming a unit of weight in early times. The Greeks were the first documented users of carob beans for weight. By 1500, Latin alchemists, still using carob beans as a basic unit of weight, measured things by the carratus. Carat and karat are the modern derivatives of carratus.

Although they have a common origin and are pronounced the same, carat and karat now have different meanings. A carat is a unit of weight in gemstones. A "carat" today is standardized at 200 milligrams, which takes the burden off the beans. "Karat," the measure of the purity of gold,

also is based on the weight of beans, but in this case has come to equal a unit of one-twenty-fourth pure gold. Carat is abbreviated as c. or ct., while karat is k. or kt.

How unusual is it that every carob bean weighs the same? Have your child try this with another bean, such as the lentil or the coffee bean, to see if they are roughly standard in weight. This is a useful exercise in using a scale to measure very small amounts, or you can take several sets of 100 of the bean and see if each set is of the same weight.

Main Lesson Book: have your child compose a short text and corresponding illustration to retell the legend of the magic bean tree

Cooking With the Metric System

The metric system is easy to learn and simple to use. There are only a few basic units, and they are generally related to each other by simple factors of 10. The metric system has a single unit for weight (the gram), another for volume (the liter), and another for length (the meter.) Unlike customary units, these units are exactly the same sizes in all countries and for all uses.

If these basic units are too big or too small for a particular use, then they can be modified by adding a prefix. For example, "kilo" means 1000 times bigger. A kilogram is 1000 grams, and a kilometer 1000 meters. Here is a table of the prefixes your are most likely to encounter in the kitchen.

Prefix	Symbol	Value	Meaning
kilo	k	1000	A thousand times bigger
deci	d	0.1	Ten times smaller
centi	c	0.01	A hundred times smaller
milli	m	0.001	A thousand times smaller

Combining the three basic units for length (meter), weight (gram) and volume (liter) with the prefixes listed above lets us create the following table of units that we will be using for cooking.

Unit (Symbol)	Quantity	Examples	Uses
milliliter (ml)	Smaller volumes	About the volume of a kidney bean	For measuring most liquids. Not used very often for non-liquids. For quantities larger than about 1000 ml, the **liter** is normally used.
liter (l)	Large volumes	Slightly more than 1 quart	For measuring larger amounts of liquids or the volume of pots, mixing bowls, etc. Liters are not usually used for measuring dry ingredients. Note that one liter is the same as 1000 ml.
gram (g)	Smaller weights	About the weight of a kidney bean	For measuring the majority of non-liquid ingredients, including flour, sugar, meats, cheeses, butter, etc. For quantities larger than 1000 g, the **kilogram** is usually used.
kilogram (kg)	Large weights	A bunch of grapes or a large loaf of bread	For measuring larger quantities of non-liquid ingredients, including meats, fruits, and vegetables. Note that 1 kg is the same as 1000 g.
centimeter (cm)	Length	About the width of the nail on your little finger	Any time a traditional American recipe gives something in inches, the metric recipe will probably specify centimeters.

millimeter (mm)	Length	About the thickness of uncooked angel hair pasta	In the kitchen, millimeters are most likely to be used for measuring very small lengths. Note that 10 mm are the same as 1 cm.

It comes in handy to know that 1 liter of water weighs 1 kg, and would exactly fill a cube 10 cm on a side. Similarly, 1 ml of water weighs 1 g, and would exactly fill a cube 1 cm on a side.

Temperature

Temperature in the metric system is usually measured in degrees Celsius (°C). This is the one quantity that many American cooks may need to know in customary units (°F), since most ovens in the U.S. don't have a Celsius scale. Here is a table with some common temperatures in °C.

Temperature	Description
0 °C	Water freezes
21 °C	Room temperature
30 °C	Good beach weather
37 °C	Body temperature
100 °C	Water boils
200 °C	A hot oven

Equipment

Measuring liquids in milliliters is easy. Every liquid measuring cup I've ever seen always has a metric scale on at least one side. In the picture, from left to right, 250 ml, 1 l, and 500 ml.

A good scale that measures in grams and/or kilograms is the one tool that a traditional kitchen may not have. A cheap mechanical scale will work fine, but I prefer an electronic one. If you buy a new scale, pick a model with a large enough platform to comfortably hold a large mixing bowl, and one with a high enough range for the largest things you are likely to cook. Metric recipes routinely specify quantities of non-liquid ingredients by weight, not volume, so you may find yourself using a scale more often than measuring cups.

Measuring by weight has a few advantages:

- Weight is more accurate than volume, since it isn't affected by how well packed or sifted, finely or coarsely chopped, etc. the ingredient is,
- It's quicker and simpler. By measuring directly into the mixing bowl, there are no measuring cups to level off, no messes from leveling off measuring cups, less need for sifting, and no dirty measuring cups to wash,

- Recipes can specify any weight, without being restricted to the specific sizes of measuring cups available. There is no more need for oddball measures like "one cup minus two tablespoons" as is seen in some recipes.

Here are a few other handy items that most kitchens already have lying around. American measuring teaspoons and tablespoons are very nearly 5 ml and 15 ml, respectively. Meat and candy thermometers typically include both Fahrenheit and Celsius scales. A ruler or tape measure including millimeters and centimeters may also come in handy.

Anyone posting a recipe on the internet has good reasons to convert it to metric. Internet readers are a global audience, and it is likely that over half of all readers of your web site or posting are reading it from outside the U.S. Measures like cups, pints, pounds, and tablespoons have different sizes in different countries, so a recipe in customary American units may not turn out right if cooked in the British Isles (for example), and vice versa. Specifying your recipe in metric units ensures that it can be properly interpreted everywhere. Writers of cookbooks can also benefit from metricating their recipes, since books are bought and sold on the global market.

from The Metric Kitchen: http://www.jsward.com/cooking/cooking-metric.shtml

Independent Skills Review

Time

Set B
give your child a list of important holidays, birth dates, and other events which belong on the family calendar (these can be written down and handed to her in a list form or she can transfer the information from one calendar to another; or she can call friends and relatives to request their birth dates) – have her add these special days to the family calendar

Having her use her own month names will be fun for a while, then your child will probably decide that it's not worth it. It's too hard to exchange information with other people, or to translate what they are saying to your own system. This provides a valuable practical lesson in the importance of standardizing units of measurement to ease communication.

skill: practice in reading and using a calendar
check: that the information was added correctly to the 2006 family calendar

Set D
make an accurate kitchen egg-timer (a three minute timer) to give as a gift

skill: designing a tool to measure the passage of time
check: that the timer measures an accurate three minutes

Set E
how far away is your child's birthday in months, days, hours, minutes, and seconds?

skill: adding and subtracting units of time, conversion between units of time
check: that your child has determined the correct number of months and days
check: that your child realizes that for hours, minutes, and seconds the correct answer is constantly changing

Set E
http://sln.fi.edu/time/Journey/JustInTime/contents.html - traditional time telling activities/quizzes

Set G
The Little House - have your child read The Little House independently and work to answer these questions:
How many years are in a generation? How many years passed while the Little House fell into disrepair? Why were people moving faster and faster? Farmers only cared about day/night and the changing of the seasons – how was it different in the city? How many years did it take to move from horse-drawn carriages to the modern car?

Temperature

Set B
When you go to preheat the oven, measure how long it takes to preheat. Why doesn't it get hot right away? What happens if you try making a recipe without preheating the oven first? Try your recipe one time the wrong way and one time the correct way (cookies work well for this).

skill: reading a thermometer and a clock
skill: drawing conclusions
check: that your child realizes that baking is heavily based on science

Set C
depending on your goals for this math unit, you may want your child to practice making conversions between US and Canadian recipes. The recipes in "Everyday Food" are useful for this exercise. The recipes found in Festivals Family and Food also require conversion to metric, as they are written using British units of measurement. The conversion chart is found on page viii. After several opportunities to practice this, your child will certainly agree that standardized units of measurement make the world easier!

skill: conversions between systems of measurement in various countries
check: that your child's work is accurate
check: that your child can articulate the benefits of standardization

Set C
as your child begins work on her cumulative project, she may need some practice using a timeline. Have her go back to the activities for The Little House and create a timeline for the book, showing when each event took place.

another excellent way to practice a timeline is to make a schedule for the December holiday countdown. Your timeline may include making presents for family and friends, decorating the house, wrapping and delivering gifts, inviting guests over or having a party, and the actual holiday itself. Use Festivals Family and Food and The American Girls Handy Book for handwork suggestions and holiday activities.

Weight vs. Volume

Activation
have your child read "The Man Who Concentrated Too Hard", the story of Archimedes in Mathematicians Are People, Too. Then have her choose another mathematician's story in the book to research (using the library, non-internet sources) and learn more about and prepare a report. Why do you think that many mathematicians, who made such great contributions to our modern life, are not more well known?

skill: library skills, research skills
check: that your child can identify another major mathematician and the contribution he or she made to modern life

Set B
because measurements in baking must be so precise, many baking cookbooks call for measuring ingredients (such as flour) in a specific way. Instead of dipping your measuring scoop into the flour tin, they recommend that you spoon the flour lightly into the cup and then level it off with a knife. I've always wondered, does it really make a difference? Try measuring a set amount of flour each way and weigh the results. How do they compare?

> **skill:** using units of measurement for weight and volume
> **check:** that your child is proficient with the kitchen tools used to measure weight and volume

Set C
how many eggs did you find were in a pound? Eggs are given labels based on their weight, so buying a different size egg will mean that you will get different results. Here is the US table:

EGG SIZE & Oz. Per Dozen
Jumbo 30
Extra Large 27
Large 24
Medium 21
Small 18
Peewee 15

Visit the grocery store and buy a variety of different size eggs. Weigh a dozen of each egg and record the results to make a metric equivalent of the above table.

Egg Trivia: http://www.enc-online.org/trivia.htm

> **skill:** using a scale to measure weight
> **skill:** creating a table to show results
> **check:** that your child's measurements are correct
> **check:** that the information presented in the table is clearly presented and well organized

Set C
Kitchen Calculations – traditional measurement activities/quizzes
http://www.aeb.org/teacher/hentohome/activity_6.htm

Set C
Learning about Metric Measurement – traditional measurement activities/quizzes
http://alphaplus.ca/APUBBB/TCSB/metric/toc.htm#

> Part 3
> Capacity – Measuring Tools: Standard and Non-Standard
>
> Part 4
> Mass – Measuring Tools

Cumulative Project

"Everyday Food" magazine

In each issue of Everyday Food (available at grocery stores), a complete meal is given along with a shopping list, schedule for preparation, and recipes for each dish.

Your child's cumulative project for this unit is to complete such a task.

This will require working backwards.

- First, have your child make a list of all the recipes she would like to include in this special meal.
- Have her draw a diagram of the stovetop and oven showing where each food will be cooked, to ensure that she is not making several dishes which cook at different temperatures.
- Have her make a schedule for preparing each dish using the Holiday Dinner article on pages 102-119 of the November 2005 issue as a guideline.
- Have her prepare a master list of all ingredients necessary to make the meal, then check what you already have on hand. For any ingredient which you already have, ask her to measure what is remaining to determine if it is enough for her recipe(s).
- Have her make a grocery list of items which need to be purchased, then do the grocery shopping for the meal ingredients, including weighing produce and reading package labels to see if she is purchasing a sufficient quantity of each ingredient.
- Assist her in preparing the meal (all other stages should be completed independently).

Assessment Criteria

Content/declarative knowledge: how well does the student know the **content**?

Assess your child's work during introduction, activation, exploration, and extension components of the unit. Assess her independent skills review activities. For example,

- Can your child describe why it is necessary for us to have standardized units of measurement for time, temperature, weight and volume, and the difficulties encountered in trying to communicate with someone who uses different measurements?
- Can she explain the steps in the discovery and invention of units to measure time, temperature, weight and volume?
- Can she identify why each new time-keeping tool was an improvement over the last?
- Does she have a good sense of the development of mankind over time and how each new scientific learning is built upon layers of past discoveries and knowledge?
- Can your child explain the difference between weight and volume?
- Can she identify ways in which she herself uses these measurements in daily life and hypothesize what life would be like without them?

Quality of the **product**: how well did the student present the work in writing, speaking, etc.

Assess the quality of your child's main lesson book work. For example,

- Did she concentrate on using her best handwriting and work diligently on her illustrations?
- Were her explanations clear and easy to follow?

Assess the quality of your child's Math table assignments. For example,

- Did she maintain a neat Math table, with organized and labelled Moon Phase cards and a Temperature Graph?

Quality of the **application**: how well did the student execute the knowledge application process?

Assess your child's cumulative project. For example,

- Did she demonstrate the ability to work backwards to solve a problem?
- Did she demonstrate the ability to organize information into a list format as well as a timetable?
- Did she demonstrate the ability to read a scale as well as jar and other package labels to determine whether she was purchasing a sufficient quantity of each ingredient?
- Did she use measuring tools correctly?
- Did she successfully prepare an organized meal?